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5 April 2022 / Matilda Handsley-Davis

## Research suggests our preferences for smells aren't determined by cultural factors

The nose knows.



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Credit: Laura Olivas / Moment / Getty Images.

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The results of [a new international study](#) on smell perception show that people around the world tend to like and dislike similar smells, regardless of their lifestyle and their cultural background.

The study, published today in the journal *Current Biology*, asked 235 people to rank 10 odour molecules on a scale of most pleasant to [most unpleasant](#). The molecules were diluted in mineral oil and presented to participants using odour dispensing devices that resemble felt-tip pens (known by the brand name “Sniffin’ Sticks”).

The molecules included vanillin, which smells like vanilla, ethyl butyrate, which smells like pineapple or peach, and isovaleric acid, which smells like sweaty feet.

The participants were from three continents – North America, South America, and Asia – and their cultural backgrounds were different. Those questioned included industrialised city dwellers from New York City, Mexico City and Ubon Ratchathani in Thailand, as well as people living traditional agricultural or hunting, gathering and foraging lifestyles.



Vanillin, the main component of the scent of vanilla beans, was the most popular odour molecule in the study. Credit: Pierre-Yves Babelon / Moment / iStock.

“We wanted to examine if people around the world have the same smell perception and like the same types of odour, or whether this is something that is culturally learned,” explains Artin Arshamian, the lead author of the study and a researcher in clinical neuroscience at Karolinska Institutet in Sweden.

“Since these groups live in such disparate odiferous environments, like rainforest, coast, mountain and city, we capture many different types of ‘odour experiences’,” he adds.

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## Smell perception: a common winner

The study found that, in general, people from all groups tended to rank the smells in a similar order. The most popular smell overall was vanillin, while isovaleric acid came last. This suggests that odour preference may be universal in humans, rather than shaped by cultural differences.

Supporting this interpretation, the researchers found that the mean rank similarity of the odour pleasantness rankings for pairs of people within the same cultural grouping was only slightly higher than that for pairs of people across different cultures ( $\tau=0.32$  versus 0.28). In other words, people from the same cultural grouping didn't tend to be significantly more similar than those from different cultures in how they assessed the smells.





Isovaleric acid, said to smell like sweaty feet, was the least popular smell across study participants from around the world. Credit: Rudigobbo / iStock / Getty Images.

So, if our cultural background doesn't play a big role in shaping what smells we like or dislike, what does?

The research team reported that personal preference explains about 54% of variation in their dataset, but a close second was the molecular structure of the odour molecule, which explained 41% of variation.

To further investigate the role of molecular structure, the team created a machine-learning model that would try to predict how pleasant an odour was, based on the molecule's chemical structure. To build the model, information on the chemical structure and pleasantness (as ranked by US research participants) of 466 other odour molecules was used. The researchers then tested the model on the 10 odour molecules used in their study and found that the model's predictions of "pleasantness ranking" correlated strongly with their experimental results. This supports the hypothesis that the chemical structure of odour molecules helps determine how pleasant humans find them.

"Now we know that there's universal odour perception that is driven by molecular structure and that explains why we like or dislike a certain smell," Arshamian says.

“The next step is to study why this is so, by linking this knowledge to what happens in the brain when we smell a particular odour.”

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Matilda is a science writer at Cosmos. She holds a Bachelor of Arts and a Bachelor of Science (Honours) from the University of Adelaide.

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